

**Table 5a**  
**Maximum Permissible Exposure (MPE) for Small-Source Ocular Exposure to a Laser Beam <sup>†</sup>**

Wavelength ( $\mu\text{m}$ )	Exposure Duration, $t$ (s)	MPE		Notes
		( $\text{J} \cdot \text{cm}^{-2}$ )	( $\text{W} \cdot \text{cm}^{-2}$ )	
<b>Ultraviolet</b>				
0.180 to 0.302	$10^{-9}$ to $3 \times 10^4$	$3 \times 10^{-3}$		or $0.56 t^{0.25}$ whichever is lower.  (See Tables 8 and 9 for limiting apertures)
0.303	$10^{-9}$ to $3 \times 10^4$	$4 \times 10^{-3}$		
0.304	$10^{-9}$ to $3 \times 10^4$	$6 \times 10^{-3}$		
0.305	$10^{-9}$ to $3 \times 10^4$	$10 \times 10^{-3}$		
0.306	$10^{-9}$ to $3 \times 10^4$	$16 \times 10^{-3}$		
0.307	$10^{-9}$ to $3 \times 10^4$	$25 \times 10^{-3}$		
0.308	$10^{-9}$ to $3 \times 10^4$	$40 \times 10^{-3}$		
0.309	$10^{-9}$ to $3 \times 10^4$	$63 \times 10^{-3}$		
0.310	$10^{-9}$ to $3 \times 10^4$	0.1		
0.311	$10^{-9}$ to $3 \times 10^4$	0.16		
0.312	$10^{-9}$ to $3 \times 10^4$	0.25		
0.313	$10^{-9}$ to $3 \times 10^4$	0.40		
0.314	$10^{-9}$ to $3 \times 10^4$	0.63		
0.315 to 0.400	$10^{-9}$ to 10	$0.56 t^{0.25}$		
0.315 to 0.400	10 to $3 \times 10^4$	1.0		
<b>Visible and Near Infrared</b>				
0.400 to 0.700	$10^{-13}$ to $10^{-11}$	$1.5 \times 10^{-8}$		(See Tables 8 and 9 for limiting apertures) For multiple pulses apply correction factor $C_p$ given in Table 6.
0.400 to 0.700	$10^{-11}$ to $10^{-9}$	$2.7 t^{0.75}$		
0.400 to 0.700	$10^{-9}$ to $18 \times 10^{-6}$	$5.0 \times 10^{-7}$		
0.400 to 0.700	$18 \times 10^{-6}$ to 10	$1.8 t^{0.75} \times 10^{-3}$		
0.400 to 0.450	10 to 100	$1 \times 10^{-2}$		
0.450 to 0.500	10 to $T_1$		$1 \times 10^{-3}$	
0.450 to 0.500	$T_1$ to 100	$C_B \times 10^{-2}$		
0.400 to 0.500	100 to $3 \times 10^4$		$C_B \times 10^{-4}$	
0.500 to 0.700	10 to $3 \times 10^4$		$1 \times 10^{-3}$	
0.700 to 1.050	$10^{-13}$ to $10^{-11}$	$1.5 C_A \times 10^{-8}$		
0.700 to 1.050	$10^{-11}$ to $10^{-9}$	$2.7 C_A t^{0.75}$		
0.700 to 1.050	$10^{-9}$ to $18 \times 10^{-6}$	$5.0 C_A \times 10^{-7}$		
0.700 to 1.050	$18 \times 10^{-6}$ to 10	$1.8 C_A t^{0.75} \times 10^{-3}$		
0.700 to 1.050	10 to $3 \times 10^4$		$C_A \times 10^{-3}$	
1.050 to 1.400	$10^{-13}$ to $10^{-11}$	$1.5 C_C \times 10^{-7}$		
1.050 to 1.400	$10^{-11}$ to $10^{-9}$	$27.0 C_C t^{0.75}$		
1.050 to 1.400	$10^{-9}$ to $50 \times 10^{-6}$	$5.0 C_C \times 10^{-6}$		
1.050 to 1.400	$50 \times 10^{-6}$ to 10	$9.0 C_C t^{0.75} \times 10^{-3}$		
1.050 to 1.400	10 to $3 \times 10^4$		$5.0 C_C \times 10^{-3}$	
<b>Far Infrared</b>				
1.400 to 1.500	$10^{-9}$ to $10^{-3}$	0.1		For multiple pulses apply correction factor $C_p$ given in Table 6  (See Tables 8 and 9 for limiting apertures)
1.400 to 1.500	$10^{-3}$ to 10	$0.56 t^{0.25}$		
1.400 to 1.500	10 to $3 \times 10^4$		0.1	
1.500 to 1.800	$10^{-9}$ to 10	1.0		
1.500 to 1.800	10 to $3 \times 10^4$		0.1	
1.800 to 2.600	$10^{-9}$ to $10^{-3}$	0.1		
1.800 to 2.600	$10^{-3}$ to 10	$0.56 t^{0.25}$		
1.800 to 2.600	10 to $3 \times 10^4$		0.1	
2.600 to $10^3$	$10^{-9}$ to $10^{-7}$	$1 \times 10^{-2}$		
2.600 to $10^3$	$10^{-7}$ to 10	$0.56 t^{0.25}$		
2.600 to $10^3$	10 to $3 \times 10^4$		0.1	

<sup>†</sup> See Table 6 and Figures 8 and 9 for correction factors  $C_B$ ,  $C_C$  and time  $T_1$ . For exposure durations greater than 10 seconds and extended sources in the retinal hazard region (0.400 to 1.4  $\mu\text{m}$ ), see Table 5b.

Notes:

- For repeated (pulsed) exposures, see Section 8.2.3.
- The wavelength region  $\lambda_1$  to  $\lambda_2$  means  $\lambda_1 \leq \lambda < \lambda_2$ , e.g., 0.180 to 0.302  $\mu\text{m}$  means  $0.180 \leq \lambda < 0.302 \mu\text{m}$ .
- Dual Limit Application: In the Dual Limit Wavelength Region (0.400 to 0.600  $\mu\text{m}$ ), the listed MPE is the lower value of the photochemical and thermal MPEs as determined by  $T_1$ .